

### **REMARKS**

Claims 1-16, 18-26, and 28-52 are now pending in the application. Claims 28-30 are canceled by this amendment. Claim 52 is added by this amendment. The Examiner is respectfully requested to reconsider and withdraw the rejection in view of the amendments and remarks contained herein.

### **INFORMATION DISCLOSURE STATEMENT**

Applicants respectfully submit that the art cited in Applicants' Information Disclosure Statements should be considered during prosecution of the subject application. Applicants thank the Examiner for considering the art cited by Applicants.

### **REJECTION UNDER 35 U.S.C. § 102 AND 103**

Claims 1-7, 10 and 14-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Penney et al. "Validation of a two- or three-dimensional registration algorithm for aligning preoperative CT images and intraoperative fluoroscopy images" ("Penney") in view of the Series 9600 Mobile Digital Imaging System (Series 9600), U.S. Patent No. 6,118,845 issued to Simon et al. ("Simon") and U.S. Patent No. 6,381,485 issued to Hunter et al. ("Hunter"). Claims 12-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Penney in view of the Series 9600, Simon and Hunter as applied to Claims 1-7 and 10 above, and further in view of Penney et al. "A Comparison of Similarity Measures for Use in 2-D-3-D Medical Image Registration" ("Penney II"). Claims 28-30 and 32-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Penney in view of Series 9600, Simon and Penney II. Claims

43-44 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Penney in view of Series 9600, Simon and Penney II as applied to Claim 28 above, and further in view of U.S. Patent No. 6,282,261 issued to Mazess et al. ("Mazess"). These rejections are respectfully traversed.

Claims 28-30 have been canceled, thus the rejections thereof are rendered moot. Claims 32-35 have been amended to depend from amended Claim 31, which was indicated to be allowable as amendment. Accordingly, the rejections of Claims 32-35 are also rendered moot.

Penney, Penney II, and Series 9600 have been previously discussed and Applicants incorporate Applicants' prior arguments regarding these cited art references.

Simon is directed to image processing to improve images that include visual artifacts generated by calibration markers. Simon discloses that the artifacts, left in images by opaque or semi-opaque markers, can be eliminated by subtracting a constant offset from each marker. See, Simon, Abstract. In particular, Simon discloses that the values of the pixels of the identified marker are altered based upon the surrounding pixels. See, Simon, col. 5, lns. 35-44.

Hunter is directed to a method of determining or illustrating positions of two structures during a procedure. Sensors can be positioned in a magnetic field to determine the position of the sensors.

Mazess is directed to a system that uses multiple modes to correct an image. For example, multiple cameras with different correction factors associated therewith can be used to generate an image. See, Mazess, col. 2, lns. 17-25.

Claim 1 recites, "generating a digitally reconstructed radiograph . . . (a) wherein the first patient orientation information includes determining how the patient was positioned or oriented relative to an imaging device during acquiring the three-dimensional image data and wherein the second patient orientation includes determining how the patient was positioned or oriented relative to an imaging device during acquiring the two-dimensional image data." As recited in Claim 1, first and second patient information includes a patient's position or orientation during the acquisition of two image data sets. The generated reconstructed radiograph can "correspond to the two-dimensional image data" using the patient information acquired or determined during the acquisition of two data sets, as recited in Claim 1. Simon discloses removing visual artifacts from images and Hunter discloses determining the relative position of two structures. As noted in Applicants previous amendment, Penney and Penney II appear to only generate a digitally reconstructed radiograph from CT image data. Accordingly, generating a digitally reconstructed radiograph that substantially corresponds with a two-dimensional data set, as recited in Claim 1, is not anticipated or fairly rendered obvious by the art cited in the rejections.

#### **ALLOWABLE SUBJECT MATTER**

Applicants thank the Examiner for the indication that Claims 16, 18-26, 37-42 and 45-51 are allowed.

The Examiner states that Claims 8-9, 11, 31 and 36 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 8 has been amended with the subject matter of Claims 1 and 7 and should be in condition for allowance. Claim 8 recites, "refined registration employs at least two similarity/cost measures," which is indicated as allowable. Accordingly, Claim 8 should now be in condition for allowance.

Claim 31 has been amended into independent format including all of the limitations of Claims 28-30 and, as such, should be in condition for allowance as noted in the Office Action.

#### **NEW CLAIM**

New Claim 52, added by this amendment, is supported by the application as filed. Support for this new claim can be found at least in Claims 2-6 and paragraph 54 of the application as filed.

New Claim 52 also includes patentable subject matter. Initially, it is dependent from Claim 1, which should be in condition for allowance. Claim 52 also recites, "wherein the two-dimensional image data is acquired intraoperatively;" and "generate the digitally reconstructed radiographs to correspond substantially to the two-dimensional intraoperative image data." Applicants submit that the cited art, either alone or in combination, does not anticipate or fairly render such a method.

In addition, Claim 52 recites "wherein determining the estimate of the patient's orientation with respect to the dynamic reference frame is determined by combining the first patient information and the second patient information including the information of where the patient was positioned or oriented for the acquisition of the two-dimensional image data and how the patient was oriented or positioned during the acquisition of the


three-dimensional image data." Again, determining such an estimate, as recited in Claim 52, is not anticipated or fairly rendered obvious by the art cited in the rejections. For example, an estimate of the patient's orientation relative to a dynamic reference frame is obtained using patient orientation or position during acquisition of both two-dimensional image data and three-dimensional image data. Applicants submit that the art cited in the rejections fails to anticipate or fairly render obvious at least these recitations of Claim 52. Accordingly, Claim 52 should also be in condition for allowance.

### **CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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